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**United States National Cruise Plan for BASIS Research by the F/V *Sea Storm*, August -  
October, 2003**

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## Introduction

Pacific salmon returns to rivers draining to the eastern Bering Sea have been inconsistent and at times very weak. Low returns of chinook and chum salmon to the Yukon River, Kuskokwim River, and Norton Sound area of Alaska prompted the State of Alaska during 2000 to restrict commercial and subsistence fisheries and declare the region a fisheries disaster area. Weak salmon returns to these river systems follow several years of low sockeye salmon returns to Bristol Bay, which was declared a fisheries disaster region during 1998 by the State of Alaska and the U.S. Department of Commerce. Causes of the poor salmon returns to these river systems are not understood; however, the regional scale decline of these stocks indicates that the marine environment may play a critical role. Ocean conditions, particularly in the first few months after leaving freshwater, are known to significantly affect salmon survival (Holtby et al. 1990; Friedland et al. 1996; Beamish and Mahnken 2001). Mechanisms affecting marine survival of the eastern Bering Sea salmon stocks are unknown principally due to the lack of information on salmon during their marine life-history stage. In an effort to improve our understanding of the marine life-history stage of salmon in the Bering Sea, the North Pacific Anadromous Fish Commission (NPAFC) initiated a proposal for an internationally coordinated research program on salmon in the Bering Sea called the Bering-Aleutian Salmon International Survey (BASIS) (NPAFC, 2001). As part of BASIS, scientists from the National Marine Fisheries Service (NMFS), Ocean Carrying Capacity (OCC) program will conduct fall surveys over the eastern Bering Sea shelf to provide key ecological data of the eastern Bering Sea salmon stocks during their juvenile life-history stage. The goal of OCC/BASIS salmon research cruises is to understand mechanisms underlying the effects of environment on the distribution, migration, and growth of juvenile salmon in the eastern Bering Sea. Primary objectives of the BASIS survey will be to: 1) determine the extent of offshore migrations of juvenile salmon from rivers draining into the eastern Bering Sea, 2) describe the physical environment of the eastern and northeastern Bering Sea shelf waters occupied by juvenile salmon, and 3) collect biological information on other ecologically important species.

## Survey

The annual OCC/BASIS survey will be conducted at stations located over the eastern Bering Sea shelf (Figure 1). During fall 2003, the survey will begin in Dutch Harbor, Alaska on August 15 and end in Dutch Harbor on October 13 (Table 1). Participating scientists are listed in Table 2. Fish sampling north of 59°N will be along latitudinal transects; transects and sampling stations within Bristol Bay will be along longitudinal meridians (Figure 1).

The cruise will be conducted aboard the chartered fishing vessel (F/V) *Sea Storm*. Fish samples will be collected using two midwater rope trawls, models 400/580 and 300, made by Cantrawl Pacific Limited<sup>1</sup> of Richmond, B.C. Stations in relatively deeper waters along the 162°W to 166°W

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<sup>1</sup> Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

transects will be sampled using a midwater trawl model 400/580; whereas, stations in relatively shallow waters along 167°W, 168°W, and latitudinal transects north of 60°N will be sampled using a midwater trawl model 300. Both nets are approximately 198 m long, have hexagonal mesh in wings and body, and a 1.2-cm mesh liner in the codend. The 400/580 has a typical spread of 50 m horizontally and 18 m vertically; whereas, the 300 has a typical spread of 55 m horizontally and 11 m vertically. At each station, the nets will be towed at or near the surface for 30 minutes at speeds between 3.5 and 5 kts.

Salmon and other fishes will be sorted by species and counted. We expect 12,000 juvenile salmon (pink (750), chum (5,000), sockeye (5,000), coho (750), and chinook (500)) will be caught during the survey. Standard biological measurements including fork length, body weight, and sex as well as scale samples from the preferred area (for growth analyses) will be taken from subsamples of all salmon species. All other fish species will be counted and standard biological measurements including length and weight will be taken from subsamples of each species. Diets of subsamples of immature and maturing salmon as well as other marine fish will be examined onboard.

Oceanographic data will be collected at each trawl station. Depth profiles of salinity and temperature will be taken from surface to near bottom depths at each trawl station using a conductivity, temperature, and depth meter. Continuous measurements of surface temperature and salinity will be collected using a SBE-45 thermosalinograph, made by Sea-Bird Electronics, Inc<sup>1</sup>. of Bellevue, WA. Zooplankton samples will be collected at each trawl station using double oblique bongo tows taken to near bottom depths using a 60-cm diameter frame with 505 and 333 micron mesh nets.

## References

- Beamish, R.J., and C. Mahnken. 2001. A critical size and period hypothesis to explain natural regulation of salmon abundance and the linkage to climate and climate change. *Progress in Oceanography* 49:423-437.
- Friedland, K.D., R.E. Haas, and T.F. Sheehan. 1996. Post-smolt growth, maturation, and survival of two stocks of Atlantic salmon. *Fishery Bulletin* 94:654-663.
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- North Pacific Anadromous Fish Commission 2001. Draft plan for NPAFC Bering-Aleutian Salmon International Survey (BASIS). NPAFC Doc. 579. 27 p.

Table 1. Cruise itinerary for the NMFS OCC August 15 – October 13, 2003 BASIS research cruise.

Date	Location/Activity
Leg 1	
15-August	Scientists arrive in Dutch Harbor, AK
16-August	Load scientists and gear
17-August	Leave Dutch Harbor, enroute Norton Sound (620 nm)
18-August	Enroute Norton Sound (eastern end of 64°N transect)
19-August	Enroute Norton Sound
20-August	Begin sampling 64°N (west)
21-August	Continue sampling 64°N (west)
22-August	Continue sampling 64°N (west); enroute 65°N
23-August	Begin sampling 65°N (east); enroute 66°N
24-August	Begin sampling 66°N (west); enroute 67°N; Begin sampling 67°N (east)
25-August	Continue sampling 67°N (east)
26-August	Continue sampling 67°N (east); enroute 68°N; Begin sampling 68°N(west)
27-August	Continue sampling 68°N (west); enroute Nome (240 nm)
28-August	Enroute Nome
29-August	Arrive Nome; unload Leg1 scientists and gear; load Leg 2 scientists
Leg 2	
30-August	Leave Nome; enroute northern end 166°W (360 nm)
31-August	Enroute northern end 166°W
1-September	Begin sampling 166°W (south)
2-September	Continue sampling 166°W (south)
3-September	Continue sampling 166°W (south)
4-September	Continue sampling 166°W (south); enroute 165°W; begin sampling north
5-September	Continue sampling 165°W (north)
6-September	Continue sampling 165°W (north)
7-September	Continue sampling 165°W (north)
8-September	Continue sampling 165°W (north); enroute 164°W
9-September	Begin sampling 164°W (south)
10-September	Continue sampling 164°W (south)
11-September	Continue sampling 164°W (south)
12-September	Continue sampling 164°W (south)
13-September	Continue sampling 164°W (south); enroute 163°W
14-September	Begin sampling 163°W (north)

15-September Continue sampling 163°W (north)

16-September Continue sampling 163°W (north)

Table 1 (Con't). Tentative cruise itinerary for the NMFS OCC August 15 – October 13, 2003  
BASIS research cruise.

Date	Location/Activity
Leg 2 (Con't)	
17-September	Continue sampling 163°W (north); enroute 162°W
18-September	Begin sampling 162°W (south)
19-September	Continue sampling 162°W (south)
20-September	Continue sampling 162°W (south); enroute Dutch Harbor (200 nm)
21-September	Enroute Dutch Harbor
22-September	Arrive Dutch Harbor, unload Leg 2 scientists and gear; load Leg 3 scientists
Leg3	
23-September	Leave Dutch Harbor; enroute southern end of 167°W (215 nm)
24-September	Enroute 167°W
25-September	Begin sampling 167°W (north)
26-September	Continue sampling 167°W; enroute southern end of 168°W (95 nm)
27-September	Begin sampling 168°W (north)
28-September	Continue sampling 168°W (North)
29-September	Begin sampling 60°N (west); enroute western end 61°N
30-September	Begin sampling 61°N (east)
1-October	Continue sampling 61°N (east)
2-October	Continue sampling 61°N (east); enroute eastern end 62°N
3-October	Begin sampling 62°N (west)
4-October	Continue sampling 62°N (west)
5-October	Continue sampling 62°N (west); enroute western end 63°N
6-October	Begin sampling 63°N (east)
7-October	Continue sampling 63°N (east)
8-October	Continue sampling 63°N (east); enroute Dutch Harbor (565 nm)
9-October	enroute Dutch Harbor
10-October	enroute Dutch Harbor
11-October	Arrive Dutch Harbor
12-October	Unload Leg 3 scientists and gear; end cruise
13-October	Scientists Depart Dutch Harbor

Table 2. Participating Scientists during the August 15 – October 13, 2002 OCC juvenile salmon survey in the coastal waters of the eastern and northeastern Bering Sea.

Scientists		Affiliation
Leg 1 (Aug 15 – Aug 29)		
FPC	Angela Middleton	NMFS/ABL
	John Pohl	NMFS/ABL
	Mary Drew	NMFS/ABL
	Cindi Lagoudakis	U.S. Forest Service
	George Yaska	YRDFA
Leg 2 (Aug 30 – Sept 22)		
FPC	Ed Farley	NMFS/ABL
	Lisa Eisner	NMFS/ABL
	Marc Trudel	DFO
	Oleg Ivanov	TINRO
	Natalia Kuznetsova	TINRO
Leg 3 (Sept 23 – Oct 13)		
FPC	Jim Murphy	NMFS/ABL
	Jamal Moss	NMFS/ABL
	Mary Drew	NMFS/ABL
	Oleg Ivanov	TINRO
	Natalia Kuznetsova	TINRO

FPC	-	Field Party Chief
NMFS	-	National Marine Fisheries Service
ABL	-	Auke Bay Laboratory
TBD	-	To Be Determined
YRDFA	-	Yukon River Drainage Fisheries Association

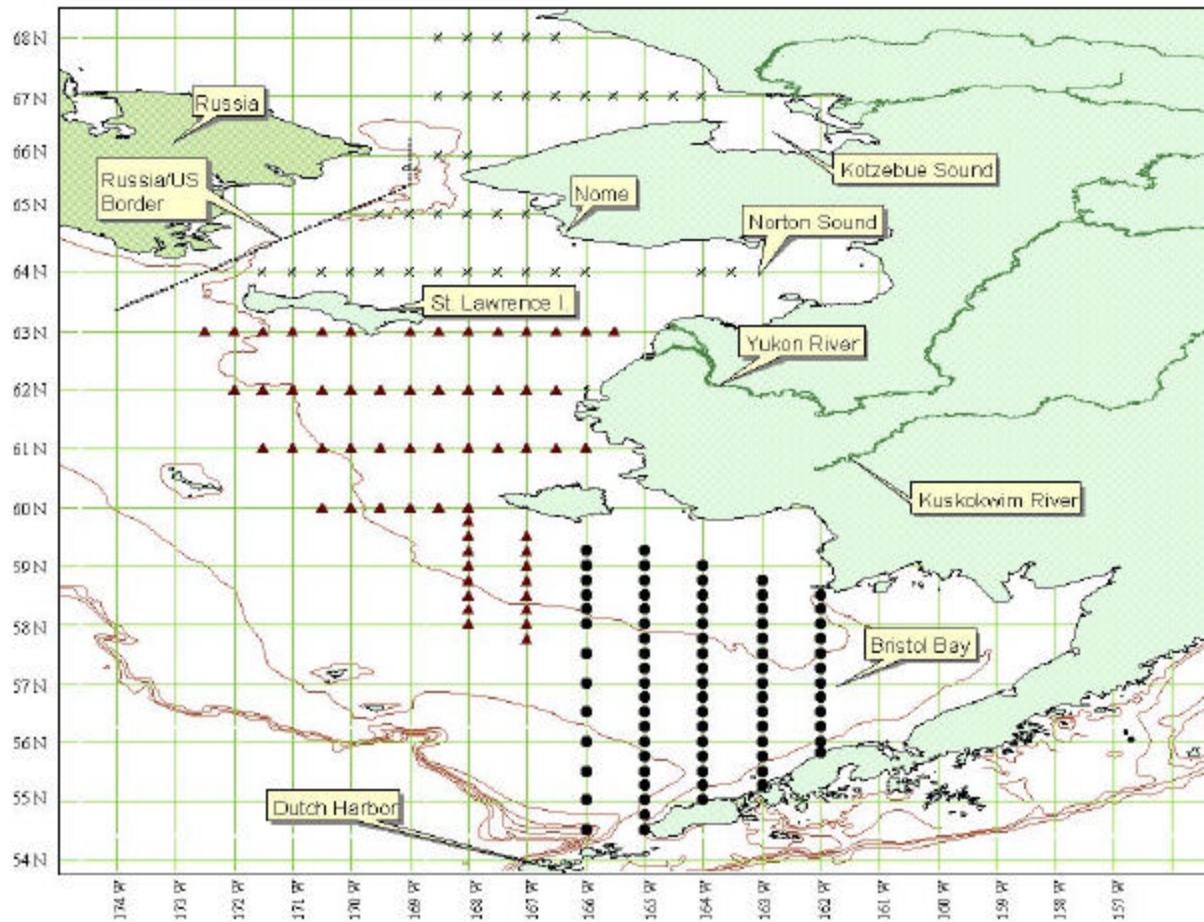


Figure 1. Proposed transects and station locations (X's – Leg 1; dots – Leg 2; triangles – Leg 3) to be sampled by NMFS OCC program as part of the BASIS 2003 survey, August 15 – October 13, 2003.